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# GEOPHYSICAL VARIABLES AND BEHAVIOR: CIII. DAYS WITH SUDDEN INFANT DEATHS AND CARDIAC ARRHYTHMIAS IN ADULTS SHARE A FACTOR WITH PC1 GEOMAGNETIC PULSATIONS: IMPLICATIONS FOR PURSUING MECHANISM[1]

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*Summary.*—If geomagnetic-mediated stimuli trigger many sudden infant deaths, then the days in which they and hospital admissions for cardiac arrhythmias for adults occur should share a similar source of variance. Factor analyses of the days in which a sudden infant death occurred in Ontario or adults were admitted for one of eight categories of cardiac crisis in the Sudbury (Ontario) Region for the year 1984 supported the hypothesis. This factor, with which infant deaths and adult cardiac arrhythmias each shared about 40% of their variance, also shared about 40% of the variance with a factor with which about 35% of the variance in daily occurrence of geomagnetic pulsations (0.2 Hz to 5 Hz) was associated. These results are consistent with the important role of geomagnetic variables in the occurrence of transient electrical anomalies in brain function rather than cardiac blood flow.

Although there are multiple postmortem correlates attributed to Sudden Infant Death (SIDs), the actual predisposing and precipitating stimuli for these events have not been established. Sudden deaths of infants occur as clusters over a few days across areas involving tens of thousands of square km. This pattern suggests a significant role of pervasive environmental variables whose presence might precipitate cellular events that lead to sudden death. If these environmental variables existed, they might also evoke other catastrophic biological events whose mechanisms are more clearly understood.

On the bases of previous research (O'Connor & Persinger, 1999), we predicted that daily numbers of sudden infant deaths over a large area should share the same source of variance as the numbers of adult cardiac arrhythmias within a subset of that area. Unlike other cardiac crises, arrhythmias are often associated with desynchronization within descending neural pathways to the heart (Oppenheimer, Wilson, Guiraudon, & Cechetto, 1991). For the year 1984 we obtained the daily numbers of infant deaths in Ontario (total = 142) from Statistics Canada. The daily numbers (total per year in parentheses) within the Sudbury Region, Ontario for arrhythmias (34), atrial fibrillations (30), congestive heart failures (45), anginas (204), chest pains (140), anterior myocardial infarcts (204), inferior myocardial infarcts (86), and posterior myocardial infarcts (149) were extracted from our

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database (Persinger, Balance, & Molland, 1993). We selected this year because continuous measurements for numbers of episodes of pc1 (continuous pulsations between 0.2 and 5 Hz) from Bortok, Russia ($N=490$) are available.

The results of the factor analyses ($n=366$ d) supported our prediction. Both before and after varimax rotation, only arrhythmias (.56, .61) were positively and significantly ($r>.30$) loaded on the same factor as numbers of infant deaths (.55, .69). The only other class of heart problems which loaded on the factor was inferior myocardial infarcts. They were negatively loaded (–.39, –.55) on this first emerging factor whose eigenvalue was 1.31. Factor analyses were also completed for this factor, the three other factors (none of which were significantly loaded by the numbers of infant deaths) that had emerged during the first analyses, and the numbers of episodes of pcs per day and the previous day. After varimax rotation, the factor upon which the shared variance with adult arrhythmias and infant deaths had been loaded (.81) was not loaded by number of pcs.

To discern if days on which these events occurred were more critical than the numbers of events per day, values for all variables were recoded as 0 or 1. Factor analyses reiterated the shared variance for days with adult arrhythmias (.51, .62) and infant deaths (.62, .65) and inferior myocardial infarcts (–.41, –.51) before and after varimax rotation. The eigenvalue for this factor, which was the first of five factors that emerged, was 1.28. When these factor scores were factor analyzed with the occurrence of pcs on the day and the previous day, only one of the three of the second-order factors (after varimax rotation) upon which both infant deaths and arrhythmia were loaded (.62) was also associated with the occurrence of pcs on the same day (.59) but not the previous day (.05).

That only cardiac arrhythmias in adults positively and significantly loaded on sudden infant deaths while the other types of cardiac pathologies did not is consistent with an electrical rather than a vascular origin for both. Oppenheimer, *et al.* (1991) showed experimentally that cardiac arrhythmias and sudden death can occur when R-wave triggered feedback from the heart is directed into the insula. The potential contribution of pc1 pulsations to this desynchrony, perhaps because of the sudden disengagement of the gradual entrainment of afferent neurons within the parasolitary nucleus (that had been slowly recruited for several hours), must still be established.

## REFERENCES

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